

## WHAT IS CLAIMED IS:

1. The method for fabricating single crystal silicon film comprises of: forming a single crystal region through a laser irradiation after forming a semiconductor layer or a metal thin film on a transparent or semi-transparent substrate, which comprises the steps of:

forming a single crystal seed region on the substrate of the desired size by a crystallization method using laser irradiation; and

10 converting the desired region of the semiconductor layer or metal thin film into a single crystal region, using the single crystal seed region.

2. The method of Claim 1, wherein the step of forming the single crystal region comprises of :

irradiating the substrate of the desired size with a laser in a specific shape through a mask so that the laser-irradiated portion is firstly crystallized;

conducting a first scanning process which comprises moving the laser by the desired distance so that a grain in the firstly crystallized portion is grown by the desired distance;

completing the first scanning process after it was progressed by the desired distance, thereby forming a poly-

crystal island region;

conducting a second scanning process which comprises  
90° turning the laser at the end of the first scanning  
process and scanning the seed grain formed in an elongated  
5 shape in the scanning direction during the first scanning  
process, so that the seed grain is grown to form a single  
crystal region; and

irradiating the laser onto a portion of a single  
crystal seed region formed after progressing the second  
10 scanning process by the desired distance, thereby extending  
the single crystal region.

3. The method of Claim 2, which comprises the steps of:

conducting the laser irradiation onto several places  
15 of the substrate at the same time, such that single crystal  
seed regions are formed on several places by the first and  
second scanning processes; and

conducting additional scanning, starting from the  
single crystal regions as seeds, so as to extend the single  
20 crystal regions while consuming poly-crystal regions or  
amorphous regions remaining on the substrate, thereby  
forming single crystal tiles over the entire substrate.

4. The method of Claim 3, wherein the size and location of

the single crystal tiles are controlled by various combinations of the scanning direction and alignment of the laser irradiation regions and various shapes and sizes of laser slits.

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5. The method of Claim 1, wherein the single crystal region is formed over the entire substrate, or a portion where a semiconductor device is formed, or a portion where a circuit region of the semiconductor device is formed.

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6. The method of Claim 1, wherein the transparent substrate includes glass, plastic and insulating film.

7. The method of Claim 6, wherein the insulating film is a  
15 Si nitride or oxide film selected from  $\text{SiO}_x$ ,  $\text{SiO}_x\text{H}_y$ ,  $\text{SiN}_x$ , and their bilayer or multiple layer, or a film of nitride or oxide of a metal selected from Al, Cu, Ti and W.

8. The method of Claim 1, wherein the semiconductor layer is  
20 made of one selected from a-Si, a-Ge, a- $\text{Si}_x\text{Ge}_y$ , poly-Si, poly-Ge, and poly- $\text{Si}_x\text{Ge}_x$ .

9. The method of Claim 1, wherein the metal thin film is made of a metal selected from Al, Cu, Ti, W, Au and Ag, or a

compound of the metal and a semiconductor.

10. The method of Claim 1, wherein the laser is an excimer laser.

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